

# WEATHER AND CIRCULATION OF JUNE 1973

## Warm in the North, Cool in the South

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### 1. MEAN CIRCULATION

A well-developed Gulf of Alaska Low was a prominent feature of the mean 700-mb circulation for June 1973 (figs. 1, 2). This Low was slightly east of its May position (Dickson 1973), as were the other major components of the wave train over the Pacific Ocean, in response, partially, to the continued strength of the midlatitude westerly flow. Wind speed along the axis of maximum 700-mb wind from south of Japan to the Washington-Oregon coast (fig. 3) averaged at least 5 m/s faster than normal over the entire route. The maximum departure, in excess of 11 m/s, was reached in the strong height gradient

between the Gulf of Alaska Low and the broad subtropical ridge to the south.

Mean 700-mb height departures fell over much of western North America from May to June (fig. 4) as short-wave impulses from the mean Low in the Gulf of Alaska moved eastward across the continent. The blocking High over western Canada weakened slightly and moved northward while the southern portion of the associated ridge was less amplified than it had been in May. Elsewhere, a strongly tilted trough stretched from a Low in the Davis Strait southwestward into Texas while a ridge was located along the Atlantic coast.

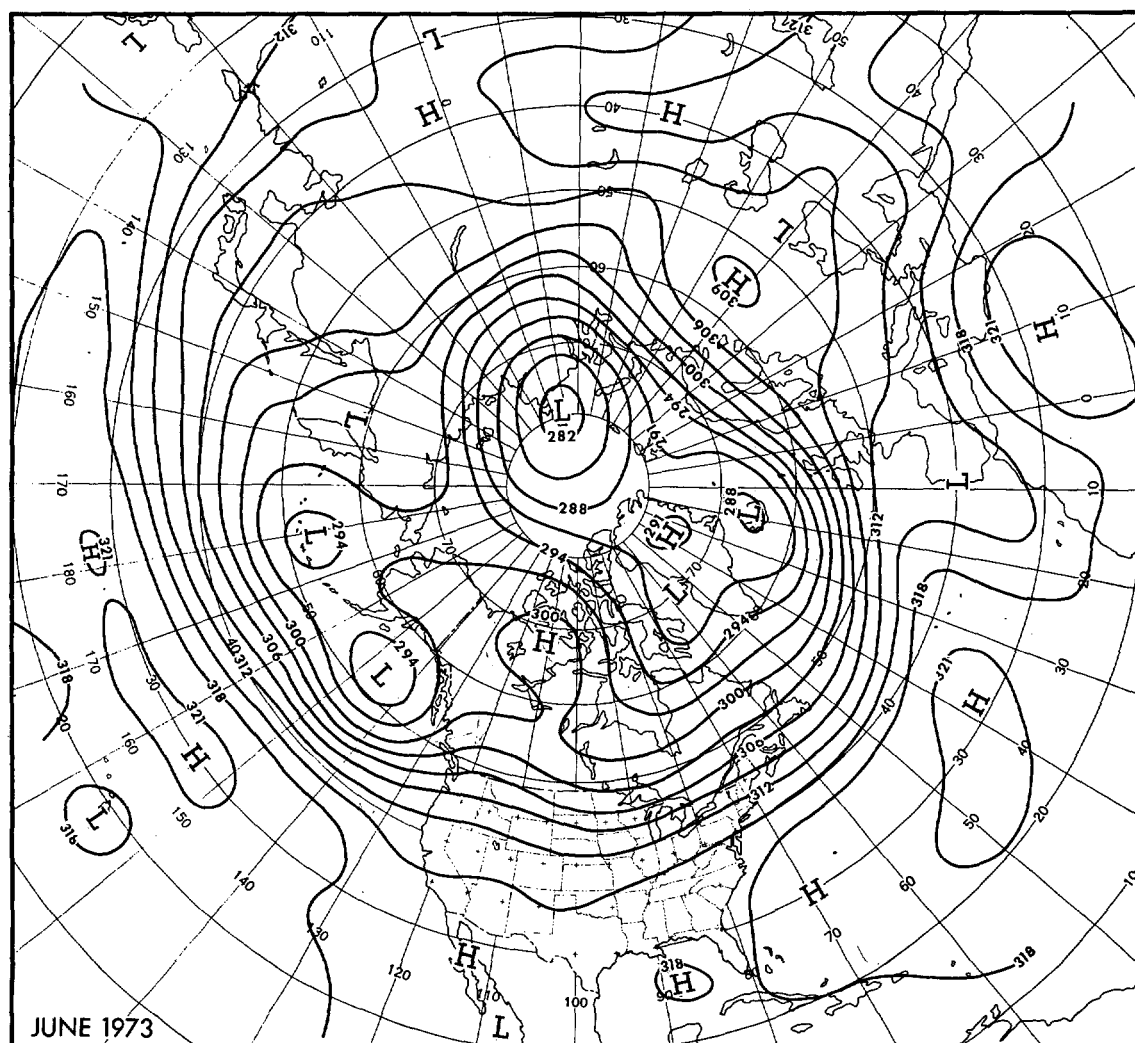


FIGURE 1.—Mean 700-mb contours in dekameters (dam) for June 1973.

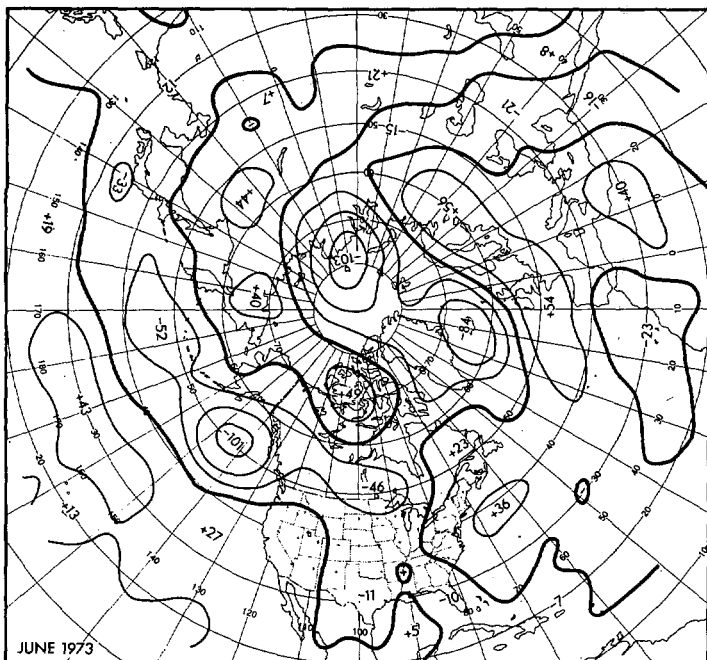


FIGURE 2.—Departure from normal of mean 700-mb height in meters (m) for June 1973.

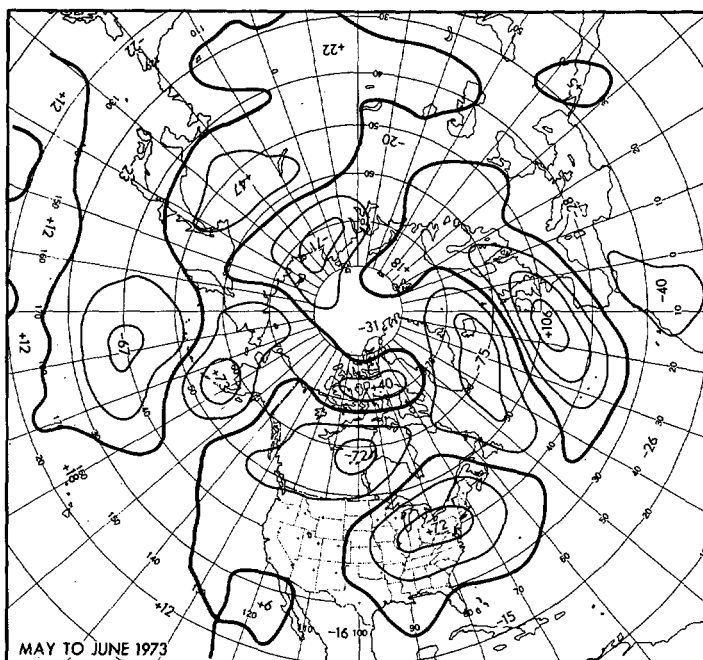


FIGURE 4.—Mean 700-mb height anomaly change (m) from May to June 1973.

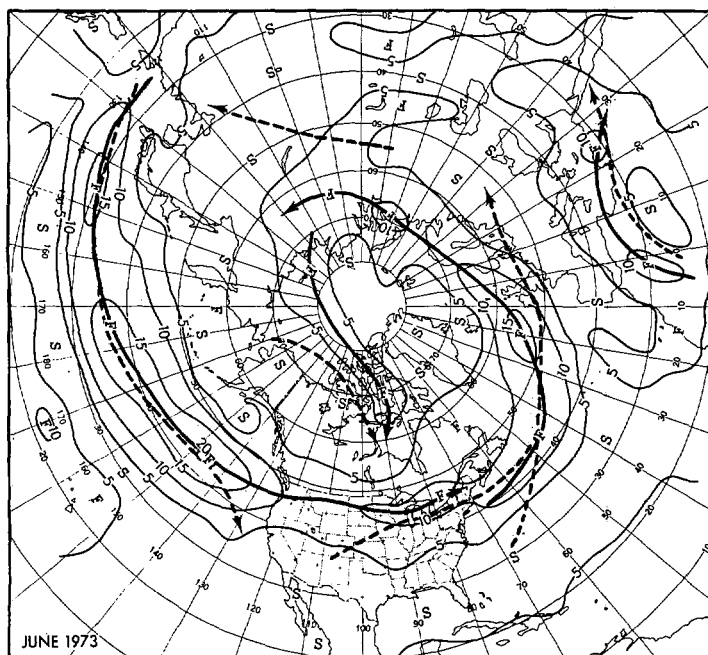


FIGURE 3.—Mean 700-mb geostrophic wind speed (m/s) for June 1973. Solid arrows show the observed axes of maximum wind speed, and dashed lines show the normal.

Mean heights over the Atlantic Ocean were mostly above normal at midlatitudes. This was in association with the ridge along the coast of North America and the more prominent ridge that extended northeastward from the subtropical High near midocean. The weak Low near Portugal and the attendant trough were about all that remained of the sharp trough of May as anomalous heights rose by more than 100 m near Great Britain. Mean heights were below normal over the northern

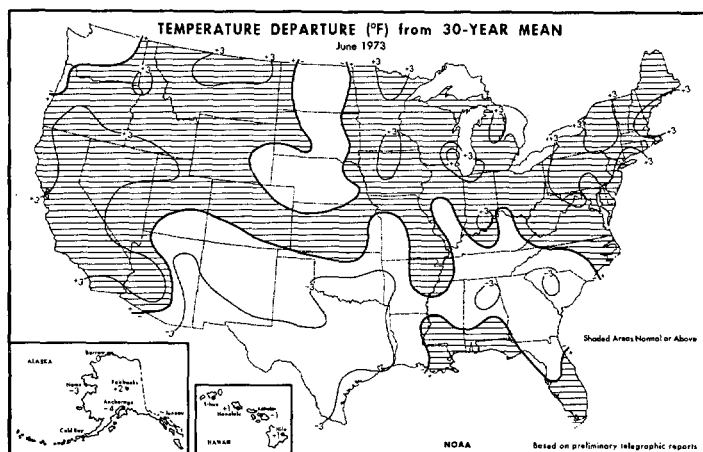


FIGURE 5.—Departure from normal of average surface temperature (°F) for June 1973 (from NOAA and Statistical Reporting Service 1973).

Atlantic due primarily to the development of a mean Low over Iceland.

The general character of the circulation pattern over Europe and Asia was not greatly different from that in May. Blocking over northern Europe strengthened somewhat as did the polar Low north of the ridge, and the axis of maximum wind speed moved well north of normal from Great Britain to central Asia. Ridging to the south and east of the polar Low resulted in positive height anomalies in a band from southern Asia, through Siberia, and connecting with the block over northern Canada.

## 2. TEMPERATURE

Surface temperatures averaged above normal in part of the Southwest and across much of the northern half

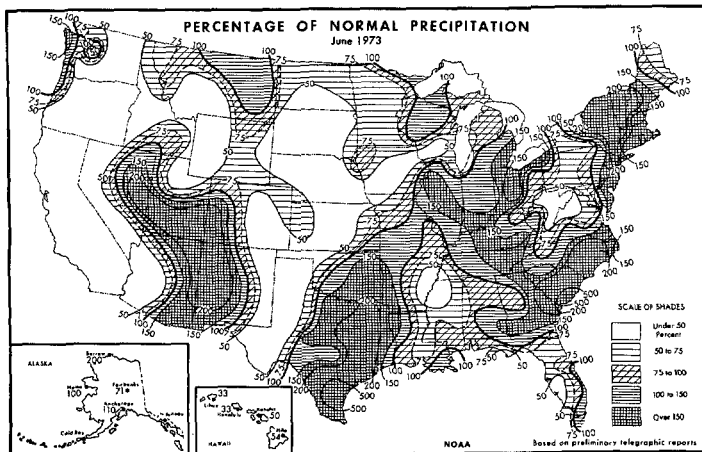


FIGURE 6.—Percentage of normal precipitation for June 1973 (from NOAA and Statistical Reporting Service 1973).

of the Nation during June 1973 (fig. 5). This warmth was associated with mean 700-mb ridges near both the east and west coasts together with fast zonal flow across the North (figs. 1, 3) that prohibited major intrusions of cold polar air into the country. Below-normal temperatures predominated across much of the South, however, and were, in part, related to occurrences of heavier than normal monthly precipitation within the region (fig. 6).

Above-normal mean 700-mb heights over the Southwest were associated with unusual June warmth in California. Maximum temperatures exceeded 90° F on 4 days at San Francisco's International Airport, a new June record. This month was the warmest June of record at Long Beach and it was the warmest June since 1918 at Sacramento. It was also the second warmest June at Hartford, Conn.

### 3. PRECIPITATION

Precipitation amounts during June 1973 were less than normal over most of the United States westward from the Great Plains (fig. 6). Precipitation was less than one-half the June normal in the vicinity of the mean 700-mb ridge in the West as well as in much of the Great Plains region, largely to the rear of the mean trough. The dryness in the Northwest contributed to a worsening drought situation in that area.

Precipitation did exceed normal in part of the Southwest due principally to two brief instances of precipitation accompanying the passage of short-wave troughs. Part of this precipitation occurred early in June and is included in the precipitation for the week of May 28–June 3 (Dickson 1973, see fig. 10C).

The precipitation pattern eastward from the Great Plains was about evenly divided between areas of wet and dry. Ahead of the mean trough, rainfall was heavier than normal over most of the area from southern Texas to the Midwest.

A stronger than normal southerly component to the mean winds along the Atlantic Seaboard helped to advect

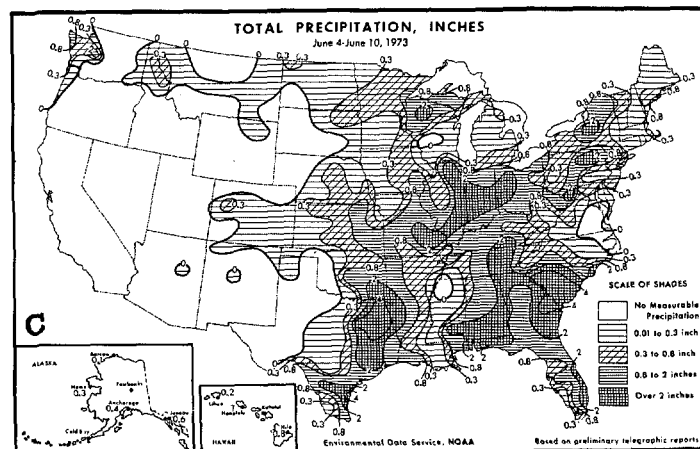
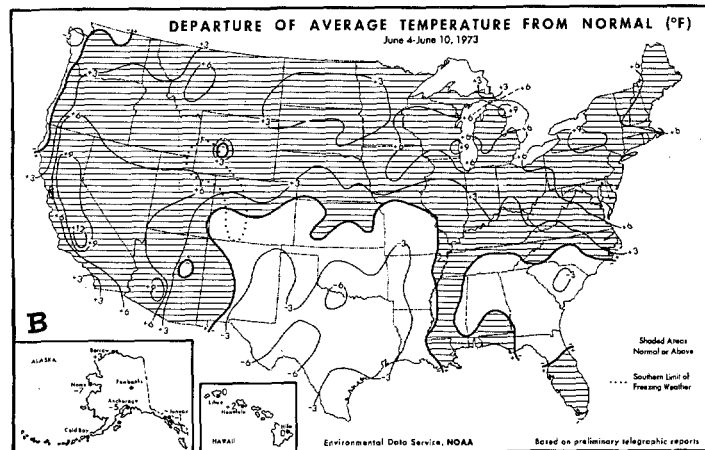
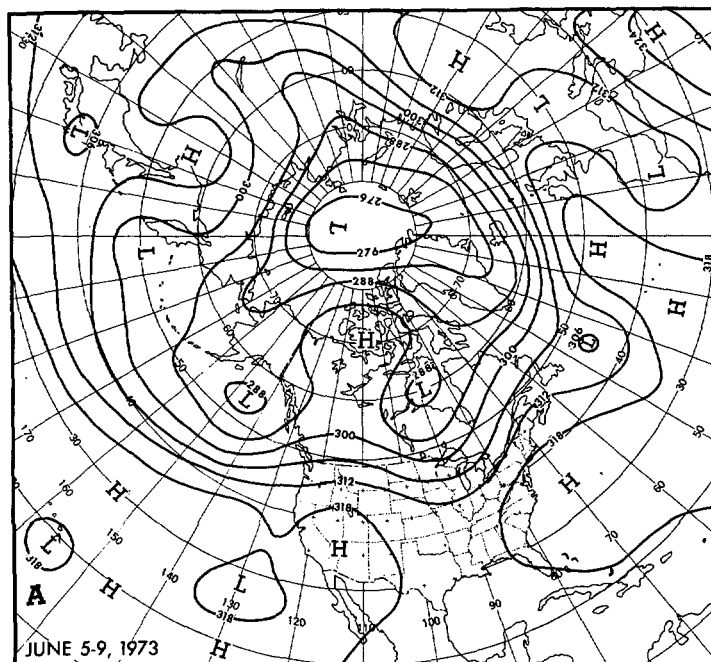


FIGURE 7.—(A) mean 700-mb contours (dam) for June 5–9, 1973; (B) departure from normal of average surface temperature (°F) and (C) total precipitation (in.) for week of June 4–10, 1973 (from NOAA and Statistical Reporting Service 1973).

moisture-laden air over that region. This, combined with several periods of weak tropical activity, caused above-normal precipitation along the coast northward from Georgia.

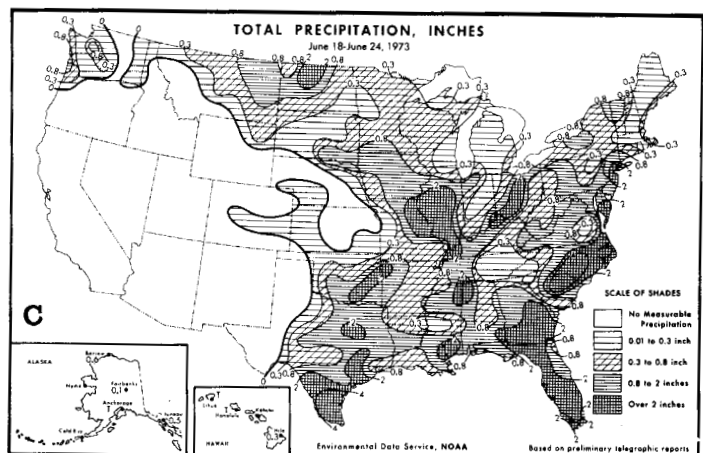
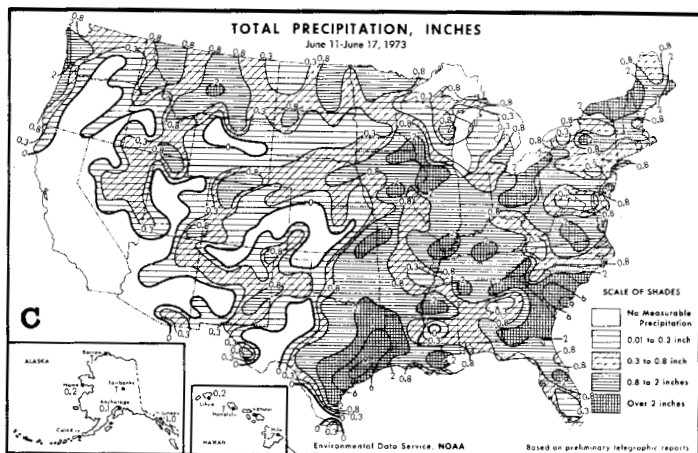
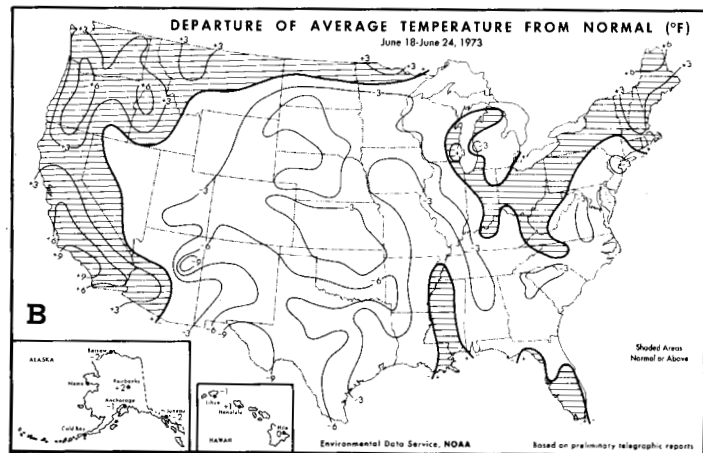
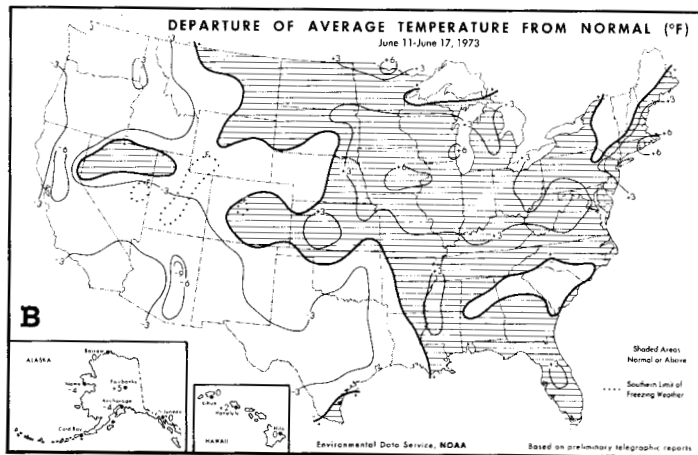
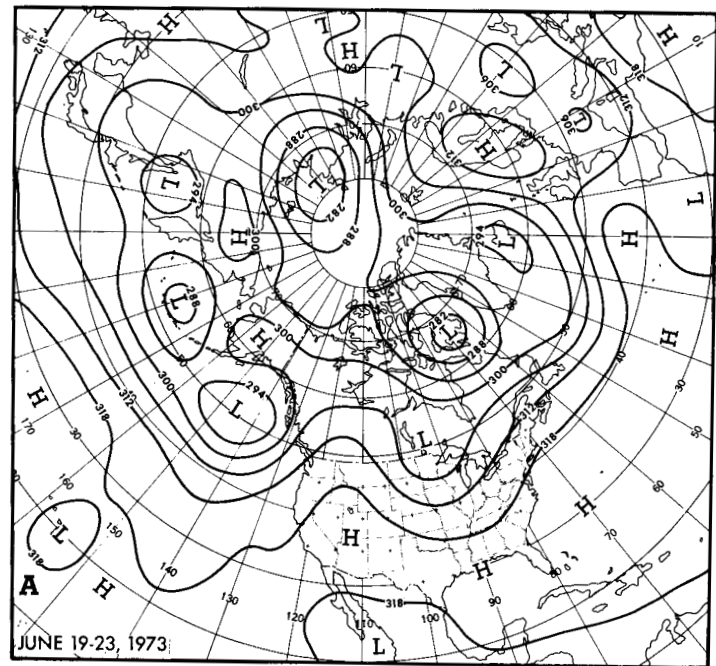
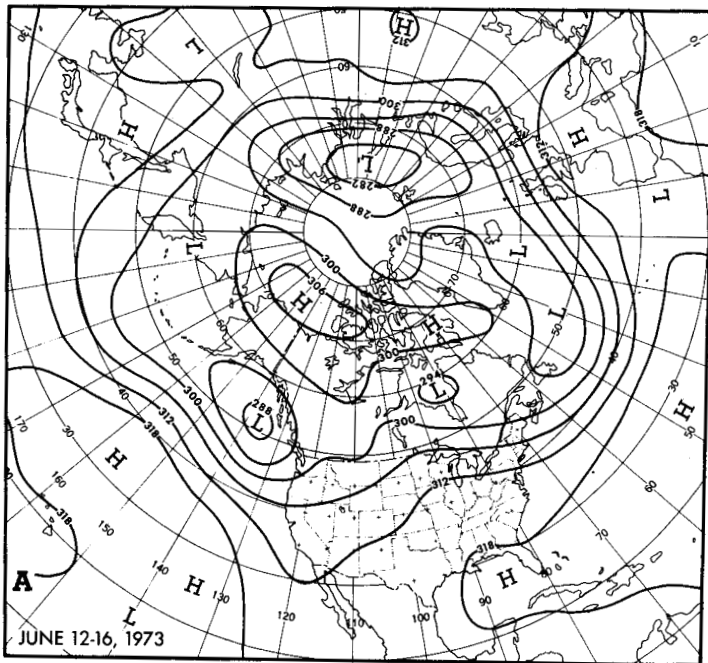


FIGURE 8.—Same as figure 7, (A) for June 12-16, 1973; (B) and (C) for week of June 11-17, 1973.

FIGURE 9.—Same as figure 7, (A) for June 19-23, 1973; (B) and (C) for week of June 18-24, 1973.

Several deluges at Charleston, S. C., during June resulted in a rainfall total of 27.24 in., the greatest monthly total ever observed at the station. Record wet Junes were noted at Columbia, S. C., and Burlington, Vt., and in

San Antonio and Corpus Christi, Tex. This month was the driest June since 1898 at Rapid City, S. Dak., and the May plus June rainfall total at Dodge City, Kans., was the least in over 100 yr of record.

## 4. WEEKLY VARIABILITY

### June 4-10

In general, the mean 700-mb flow pattern over North America for the period of June 5-9 (fig. 7A) was similar in phase to that of the mean circulation for June (fig. 1). Likewise, the basic character of the average weekly temperature anomaly (fig. 7B) resembled the monthly temperature anomaly (fig. 5).

Precipitation during the week (fig. 7C) was limited primarily to the eastern half of the country, as most of the West was dry in response to the mean ridge in that area. Heaviest precipitation totals were observed in eastern Texas and South Carolina.

### June 11-17

The mean 700-mb circulation over midlatitude North America during the second week of June (fig. 8A) was a reversal of that of the previous week. Associated with this reversal was an amplification of the midlatitude flow over the Pacific Ocean, which helped to maintain a mean trough along the west coast of North America. A weak trough was observed to the lee of the Rocky Mountains while a mean ridge was now located over the Mississippi River Valley.

Cool Pacific maritime air accompanying the mean trough brought below-normal temperatures to much of the West (fig. 8B). This cooling represented a major change from the high temperatures that were present over much of the region during the previous week.

Mean temperatures were generally above normal over the eastern half of the Nation in response to the mean ridge that dominated the region. A number of stations in the Northeast experienced record daily maximum temperatures on June 11 and 12 prior to the passage of a cold front.

Precipitation was more widespread over the country this week (fig. 8C) in accord with the changed circulation regime. Heaviest weekly totals, however, were again located in eastern Texas and South Carolina. Charleston, S.C., received 9.40 in. of rain on June 11 as thunderstorms, associated with insignificant-looking tropical activity, persisted over the city.

### June 18-24

Mean 700-mb heights over North America for the period of June 19-23 (fig. 9A) returned to an amplified version of the mean flow for June. Resurgence of the basic monthly pattern was aided by rapid eastward motion of the mean trough from the west coast to the Mississippi Valley and of the downstream ridge from midcontinent to the Atlantic coast. This eastward motion occurred as the Gulf of Alaska Low retrograded slightly and built southward, allowing a ridge to build over the Rocky Mountains.

Mean temperatures in the Far West rose rapidly to above normal this week (fig. 9B) under mean southwesterly 700-mb winds. Elsewhere across the country, mean tem-

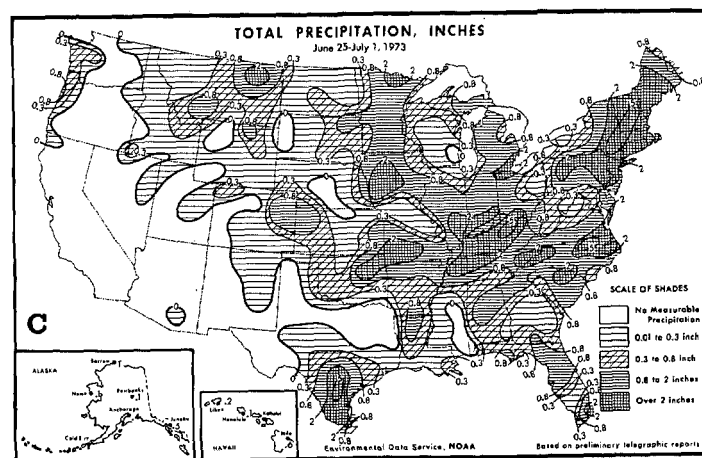
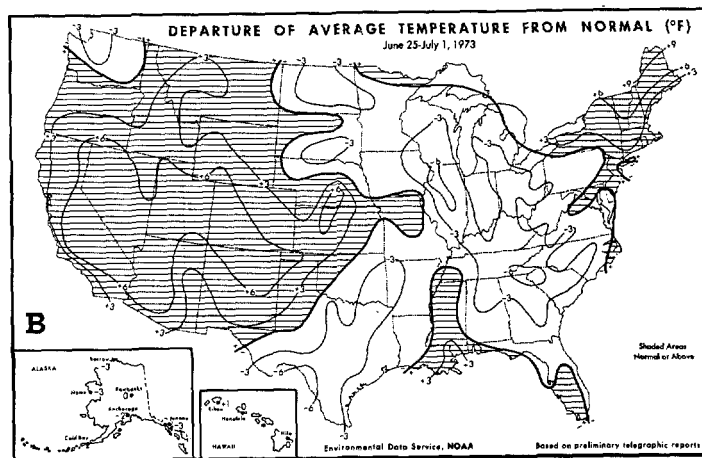
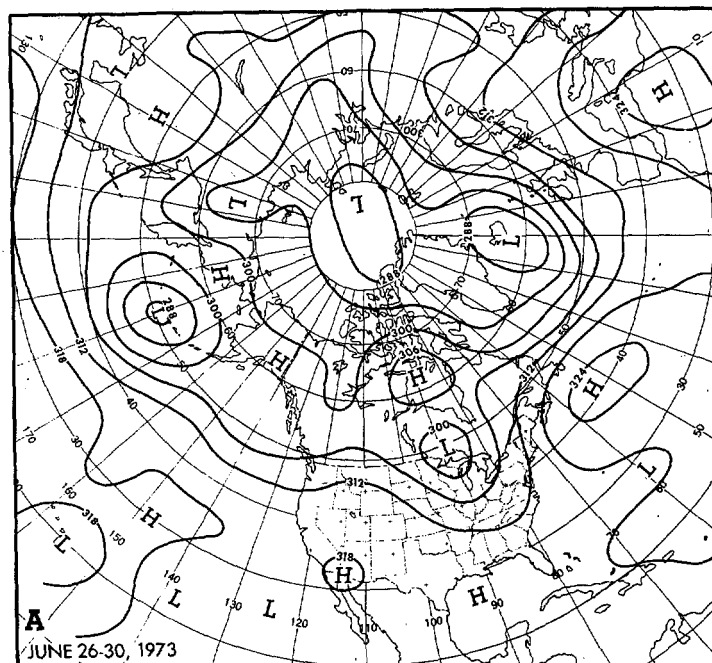


FIGURE 10.—Same as figure 7, (A) for June 26-30, 1973; (B) and (C) for week of June 25-July 1, 1973.

perature departures were mostly less than those of the previous week, except under the mean ridge in northern New England. A number of stations from the Rocky

Mountains to the Great Plains reported record low daily minimum temperatures early in the week as a mass of polar continental air crossed the area.

Much of the Nation westward from the Great Plains was dry again this week (fig. 9C) in association with the mean ridge over the area. To the east, rainfall was mostly attributable to showers and thunderstorms accompanying a cold front that moved slowly across the region.

### June 25-July 1

The mean 700-mb flow amplified over eastern North America during the last week of June (fig. 10A). While the trough over the eastern United States sharpened to the southeast, the downstream ridge strengthened as a blocking High became established south of Newfoundland. This ridge extended northwestward to a weaker blocking High over Hudson Bay.

Westward from central North America, the mean 700-mb flow deamplified. The Gulf of Alaska Low was essentially nonexistent during this period, but a well-developed Low was located over the Bering Sea.

Mean temperatures for the week (fig. 10B) were basically

above normal over the western United States with lower than normal temperatures over the East. The principal exception to this pattern was in New England where temperatures averaged up to 9° F. higher than normal in response to a mean southerly flow to the rear of the Atlantic block.

Heavy precipitation in the Northeast this week (fig. 10C) caused major flooding, particularly in Vermont. The heavy rainfall accompanied a lingering cold front that stalled over the region after midweek due to the impeding effects of the downstream block. In addition, weak tropical activity along the coast helped to push moist air over the area.

Precipitation increased over the western half of the country this week as the upper level ridge weakened.

### REFERENCES

- Dickson, Robert R., "Weather and Circulation of May 1973—Warm in the West, Cold in the East." *Monthly Weather Review*, Vol. 101, No. 8, Aug. 1973, pp. 657-661.
- NOAA, U.S. Department of Commerce and Statistical Reporting Service, U.S. Department of Agriculture, *Weekly Weather and Crop Bulletin*, Vol. 60, Nos. 24-28, June 11, 18, 25, and July 2 and 9, 1973.